

Thoracic Surgery

Iterative resections for treatment of NSCLC.

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Introduction

In pulmonary iterative resections (PIR) performed in management of NSCLC it is important to consider oncological, technical and functional problems to give exact surgical indication: this way it is possible to have satisfactory survival.

Methods

Since 1971 to 1997 in our Division of Thoracic Surgery 71 patients with NSCLC had PIR. 64 were males and 7 females, mean age was 60 ys. 58 had multiple primary lung cancer (MPLC), 7 had local relapse, 5 had stenosis after bronchoplasties and 1 patient had previous benign disease. Operability criteria were: oncological (previous radicality, no metastases, expectation of radical surgery) and functional (cardiopulmonary reserve).

Results

In our series of double MPLC first operations were 45 lobectomies (L), 9 limited resections (LR) and 2 pneumonectomies (P), while second operations were 21L, 25LR, 9 completion pneumonectomies (CP) and 1P. 2 patients had third tumor. For 7 recurrences first operation consisted in 5L, 1LR and 1P and second operations were 5CP, 1LR and 1 tracheal sleeve. All five PIR for treatment of complications were performed to treat stenosis after bronchoplasties. Patient previously operated with lobectomy for benign disease was successively treated with CP.

The global actuarial 5 ys survival was 38%. The actuarial 5 ys survival in LR was 29.8%, in L 54%, in P and CP 39%. Operative mortality was 3% and complication were 8%.

Discussion and conclusion

In therapy of second primary tumor as well as recurrence an aggressive approach in selected patients can offer good results. The surgical options depend on the extent of the disease, the radicality of initial surgery and the patient's pulmonary reserve.

TRACHEAL AND LARYNGO-TRACHEAL RESECTION AND RECONSTRUCTION FOR POSTINTUBATION STENOSIS

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Introduction. Postintubation stenosis is the most common indication for tracheal and laryngo-tracheal resection and reconstruction.

Methods. Between January 1984-December 1998, 87 patients in our department with tracheal or laryngotracheal lesions underwent airway resection and reconstruction. Fifty-nine (68%) of these patients had a postintubation stenosis. Eight patients had an associated tracheoesophageal fistula (TEF). Thirty-seven patients were male and 22 female with a mean age of 36 years (range 15-76). Thirty-four patients had undergone prior attempts to correct their stenosis, including T-tube placement (n = 21), multiple laser treatments with (n = 4) or without (n = 7) Dumon stent placement, tracheal resection and reconstruction (n = 1) and laryngoplasty (n = 1). There were 35 cuff lesions, 13 stomal lesions, 5 at both levels and 6 of indeterminate origin. A cervical incision was performed in all patients and a partial upper sternotomy was needed in 13 cases to achieve additional distal exposure. In 28 patients a circumferential resection of the trachea with a trachea-trachea anastomosis was performed. In 12 patients the trachea was sutured to the cricoid cartilage. In 19 patients the stenosis extended into the

subglottic larynx necessitating complete resection of the anterior cricoid and anastomosis of the trachea to the thyroid cartilage. In the 8 patients with an associated TEF, the management of the esophageal defect was performed in accordance to the technique described by Grillo. Length of resection was 1,5 to 7 cm. Nine had laryngeal release to reduce anastomotic tension.

Results. There was no surgical mortality. The results were good in 49 patients (83%) satisfactory in 6 (10%) and poor in 4 (7 %). The most common complications were: suture line granulations in 4 patients, anastomotic dehiscence in 3, wound infection in 3, laryngeal dysfunction in 2 and restenosis in one.

Conclusions. Resection and reconstruction remains the preferred definitive treatment for postintubation tracheal and laryngo-tracheal stenosis.

References. Grillo HC, Donahue DM, Mathisen DJ, et al. Postintubation tracheal stenosis: treatment and results. J Thorac Cardiovasc Surg 1995;109:486-49.

TREATMENT AND SURVIVAL AFTER LUNG RESECTION FOR NSCLC IN PATIENTS WITH MICROSCOPIC RESIDUAL DISEASE AT THE BRONCHIAL STUMP.

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INTRODUCTION: The aim of this study is a retrospective evaluation of survival in patients who had underwent lung resection for NSCLC and in whose microscopic residual disease was found, according to the type of infiltration, the histology, the lymphnode involvement and the post-operative treatment.

METHODS: A total of 1544 patients underwent lung resection for NSCLC at the Thoracic Surgery Unit of Siena from 1983 through 1998. Microscopic residual disease at the bronchial stump was found in 47 patients (3,04%). 30 patients had squamous cell carcinoma, 17 adenocarcinoma. Microscopic residual disease was divided in MMRD (mucosal microscopic residual disease) and in EMRD (extramucosal microscopic residual disease). 18 patients had MMRD and 29 patients had EMRD. 17 patients received postoperative radiation therapy with a total dose of 50-60 Gy and 5 patients, after a lobe resection, underwent pneumonectomy.

RESULTS: No significant difference in survival was found between MMRD and EMRD patients, neither between different histotypes. However in patients with squamous cell residual disease occurred a longer survival than in ADK patients. No significant difference in survival was found between patients with and without postoperative therapy. Median survival for the whole group having microscopic residual disease at the resection line was of 52%, 41% and 34% at 12, 24 and 36 months respectively. 14 patients are alive, 12 without recurrence, 1 with liver metastases and 1 with recurrence in the bronchial stump.

CONCLUSIONS: In microscopic residual disease at the bronchial stump, our therapeutic choice is depending from patients' pTNM. A more extended resection (pneumonectomy) can be performed only for previous lobectomies and in I-II stage patients; in stage III patients (N2 lymphnodes infiltrated), we avoid reoperation because they have a bad prognosis and we treat these patients with radiation therapy. In pneumonectomies, is suitable to not reoperate the patient in order to reduce the bronchial stump because, specially in extramucosal infiltration we have a poor prognosis with a very high risk. We follow the not treated patients with thorax CT and FBS frequently, just to detect early a neoplastic residual increase, and just to treat these cases by radiation therapy.

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PATTERN OF RECURRENCES FOLLOWING VIDEOTHORACOSCOPIC TREATMENT OF PRIMARY SPONTANEOUS PNEUMOTHORAX.

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Introduction: Videothoracoscopy (VATS) represents the gold standard in the treatment of primary spontaneous pneumothorax (PSP) even if there is still a matter of debate regarding timing and type of surgical procedure.

Methods: From July 1992 to December 1998, out of 1490 VATS procedures performed at the Department of Thoracic Surgery, Forlanini Hospital in Rome, 458 patients (30.7%) underwent VATS treatment of a recurrent ipsilateral PSP or of a first episode of PSP with prolonged air leak (> 5 days) following chest drainage. Patients were endoscopically staged according to Vanderschueren's 4 stages system. Surgical criteria were: stage I and II, isolated pleurodesis (subtotal pleurectomy or talc poudrage); stage III and IV, treatment of the bullae (stapling or ligation) plus pleurodesis.

Results: Overall recurrence rate was 4.1% (19 patients). In stage I and II, recurrence rates were 6.45% and 4.3% respectively in subtotal pleurectomy and in talc poudrage. In stage III recurrence rates were: ligation+subtotal pleurectomy, 12.19%; stapling+subtotal pleurectomy, 4.7%; ligation+talc poudrage, 4.3%; stapling+talc poudrage, 0%. In stage IV, recurrence rates were 5.26% and 0.8% respectively in stapling+subtotal pleurectomy and in stapling +talc poudrage.

Discussion: Differences in recurrence rates were calculated to compare the specific procedures and showed that as regards as pleurodesis, talc poudrage is superior to subtotal pleurectomy ($p < 0.0001$), and, as regards as treatment of the bullae, stapling is superior to ligation of the bullae ($p < 0.0001$).

Conclusion: we recommend isolated talc poudrage in stage I and II, and stapling of the bullae plus talc poudrage in stage III and IV.

Reference: G. Massard et al.: Minimally invasive management for first and recurrent pneumothorax. Ann Thorac Surg 1998;66:592-9

SURGICAL TREATMENT OF THYMOMAS: PROGNOSTIC FACTORS AND FOLLOW-UP

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Introduction: The intraoperative evidence and degree of invasion (according to Masaoka staging system) is the most important prognostic determinant and guide to therapy in patients with thymoma. The role of histopathologic appearance as independent prognostic factor remains controversial. Different classifications have been proposed. Salyer and Eggleston classification, modified by Rosai and Delgado, has demonstrated the best reliability in predicting tumour behaviour. The aim of the study was to evaluate the prognostic value of Rosai and Delgado histological classification in patients with thymoma.

Methods: From January 1990 to October 1998, 51 patients (29 males and 22 females, mean age 52 years, range 22-76) were operated on for thymoma in our Institution. According to Masaoka clinical-pathological staging there were: stage I, 26 cases; stage II, 10; stage III, 13 cases; stage IVA, 2 cases. According to Rosai and Delgado histological classification we observed: 11 predominantly lymphocytic thymomas, 12 predominantly epithelial thymomas, 5 mixed lymphoepithelial thymomas, 9 spindle cell thymomas and 14 thymic carcinomas.

Results: Forty-nine patients (96%) underwent complete surgical resection with

a 5-year survival of 69%. Forty-five patients were followed-up for 53 months (range 3-90 months).

Discussion: Spindle cell thymomas and predominantly lymphocytic thymomas demonstrated the best 5 year survival: 83% and 75% respectively. The worst prognosis was observed in predominantly epithelial thymomas with a 35% 5 year survival.

Conclusions: In our patients the modified Salyer-Eggleston classification showed a good correlation with clinical outcome and therefore it could be useful in supporting clinical staging in order to predict tumour's aggressiveness and to plan patient's management.

Reference: Ruffini et al.: Recurrence of thymoma: analysis of clinicopathologic features, treatment and outcome. J Thorac Cardiovasc Surg 1997;113:55-63

SURGERY FOR N2 NSCLC FOLLOWING INDUCTION RADIO-CHEMOTHERAPY. EVALUATION OF POST-OPERATIVE COMPLICATIONS

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Introduction. Major post-operative complications rate in resections for pulmonary carcinoma ranges between 4 and 15% in main series. Mortality rate generally lies between 2 and 5%. The most common complications resulting in that include: broncho-pleural fistulas (BPF), pneumonias (P), pulmonary embolisms (PE), myocardial infarctions (MI). The choice of neoadjuvant therapies, by now largely approved, for locally advanced NSCLCs, is related, in most author's experiences, to an increased peri-operative morbidity and mortality rate. In particular a significant higher incidence of BPFs after CT-RT pre-operative treatment is reported. We reviewed the records of IIIa-N2 and IIIb-N2 NSCLCs patients who have undergone neoadjuvant CT-RT to evaluate the impact on peri-operative morbidity and mortality.

Methods. From 1/1/90 to 30/6/96 we have operated on 47 patients (36 IIIa-N2 and 11 IIIb-N2) over 91 who were enrolled in the neoadjuvant protocol study (Carboplatin 70 mg/mq/day from day 1 to 4 and from day 24 to 28 with concurrent radiotherapy on the tumour and the mediastinum with a daily fraction dose of 180 cGy from day 1 to 28 and a total administration dose of 5040 cGy). Lobectomy was performed in 23 cases, bilobectomy in 7, pneumonectomy in 13 and wedge resection in 2 cases. Each patient underwent radical mediastinal lymphadenectomy. In 2 patients we just performed explorative thoracotomy.

Results. We report 1 major post-operative complication in 3 patients (6.4%). These include a BPF in 2 cases and 1 P in a patient deceased after right pneumonectomy on post-operative day 6th. Peri-operative mortality was 2.1%. In the two cases complicated by BPF, the operation consisted in a left superior lobectomy and a right pneumonectomy. In both cases a conservative treatment sufficed. Other risk factors such as compromised nutritional condition, diabetes, decreased respiratory function or neoplastic residual on the bronchial stump were not present in patients with complications. Complications incidence was higher in patients who underwent pneumonectomy (15.3%) compared to those who underwent lesser resections (lobect., bilobect., wedge) (3%). This difference is not statistically significant ($p > 0.001$).

Conclusions. In our experience neoadjuvant CT-RT for locally advanced NSCLC has been generally well tolerated and it wasn't complicated by a post-operative morbidity and mortality increased rate.

THE ENDOSCOPIC SURGERY OF THE MALIGNANT TRACHEAL STENOSES.

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INTRODUCTION: From 1988 to 1998, 238 laser treatments out of 201 clinical cases were performed; in 61.8% the stenosis's localization was tracheal, in 12.4% it was tracheo-bronchial and in 25.8% it was tracheo-laryngeal. Patients's mean age (66.3% males, 33.7% females) was 52 years \pm 19, with a range of 9 - 84 years and median of 56 years; 30.3% were affected by malignant tumours: in 74.1% were primitive and in 25.9% were secondary tumours.

METHODS: Our experience is based on the endoscopic treatment by Nd-YAG laser therapy with rigid or flexible bronchoscope.

Moreover, 17 stents were used (13 Dumon, 2 Montgomery's tubes, 1 Long Term Cannula and 1 Tracoe Cannula).

RESULTS: Perioperative morbidity and mortality was irrelevant; perioperative massive haemoptysis occurred in 1 patient only, who was submitted to radiotherapy at the same time.

95.8% of the patients died and presented a minimal survival of 20 days, maximum of 1326 days (mean 167.74 days, S.D. \pm 274.93; median 83 days). The follow-up of the living patients is: minimum 68 days, maximum 1620 days (mean 824.75 days, S.D. \pm 649.09; median 805.5 days).

DISCUSSION and CONCLUSIONS: In the following 24-48 hours both subjective and objective changes of the pulmonary function, haemogasanalysis and radiologic aspects were observed. The results showed an improvement in the respiratory parameters and a sensible improvement in the quality of life.

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Malignant pleural mesothelioma: our experience (1985 - 1998)

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Introduction.

Better results in treatment of malignant pleural mesothelioma (MPM) are achieved with a multimodality approach.

Methods.

Since January 1985 to October 1998 the Thoracic Surgery Division of Padua and the associated Thoracic Surgery Ward of City Hospital of Castelfranco Veneto (TV) have performed 82 operations for MPM. Males were 58, females 24. Median age was 57.5 ys. Istologically 53 patients had epithelial type, 6 sarcomatous type and 28 mixed type. Mesotheliomas were staged according to "New International Staging System for Diffuse Malignant Pleural Mesothelioma" proposed by I.M.I.G. 62 patients received pleurectomy/

decortication, 6 extrapleural pneumonectomy (EPP) and 14 diagnostic thoracothomy. Surgical treatment was completed in a part of cases with chemotherapy in pleural cavity and/or systemic via and/or with external radiation beam.

Results.

Global median survival we obtained was 11 months. Epithelial type had median survival of 15 months, sarcomatous type 6 months and mixed type 11 months ($P=0.0075$).

Discussion and Conclusion.

Recent multidisciplinary works permitted to emphasize the following points: a) the importance of istologic variety; b) the TNM staging proposed by IMIG identifies with precision the prognostic factors (T,N); c) PPE plus external radiation beam plus chemotherapy seems to permit a better local control of disease, but not to prolong survival; d) pleurectomy/decortication has to be considered better way of palliation at all; e) it is necessary to test new chemotherapeutic agents such as Gemcytabin, that in some preliminar studies seems to have produced a response rate of 55 %.

IATROGENIC TRACHEAL INJURIES: CONSERVATIVE OR SURGICAL TREATMENT?

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In this report we illustrate our experience in the treatment of iatrogenic tracheal injuries, comparing the different therapeutic options (surgical and conservative).

From 1994 to 1998 we observed 5 patients (all of them were women) with suspected iatrogenic tracheal laceration. The intubation was achieved with single-lumen endotracheal tube in the 4 cases in which the cause of the laceration was due to intubation; in all cases but one, the procedure was described by the anesthesiologist as uneventful. In the single case of tracheostomy, the technique used was the Fantoni's percutaneous one. The opening symptoms were: subcutaneous emphysema (5 cases) and dyspnea (1 case); the radiologic signs were pneumomediastinum and subcutaneous emphysema (5 cases), pneumothorax (3 cases). This signs appeared at extubation; in only one case they appeared about 12 hours after extubation. The lesion, diagnosed at the fiberoptic bronchoscopy, was always linear, situated on the tracheal pars membranacea; 2 of them at the level of tracheal upper and medium III, 3 at the inferior III; the average length was of 5 cm (range 3-6 cm), in presence of a normal tracheal wall and surrounding mucosa. 2 cases were treated in a conservative manner on the basis of lesion length and site, and patients' clinical stability; the therapy was based on antibiotic and antitussive. The surgical treatment (3 patients) was achieved with full thickness interrupted absorbable sutures of the tracheal wall with a right postero-lateral approach. The fiberoptic bronchoscopic follow-up at a week and a month after the causing event showed a complete heal of the lesion, covered by a tough fibrous tissue; the radiologic examination (CT of the neck and thorax) allowed us to point out the complete resolution of pneumomediastinum and the absence of lesions among the mediastinal structures.

CONCLUSION: This retrospective analysis of the patients affected by iatrogenic tracheal injuries has allowed us to point out that, in selected and in always more cases (also underlined by other authors in the literature), the conservative treatment is not only justified, but also mandatory in the therapy of this complications.

RADIOTHERAPY VS FOLLOW UP IN PATHOLOGICAL STAGE I NON SMALL CELL LUNG CANCER (NSCLC): A FIVE YEARS' RANDOMIZED STUDY

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Objective. This study has been planned to evaluate the effect of Radiotherapy as adjuvant treatment on recurrence rate and survival in patients with pathological Stage I Non Small Cell Lung Cancer (NSCLC). The present report reviews our recent experience.

Methods. From July 1989 through July 1994 70 patients with NSCLC who presented with pathological stage Ia-T1N0 and Ib-T2N0 have been observed and treated. Male/female ratio was 60/10 and the mean age was 62 (range 48-75 yrs). All the patients underwent major pulmonary resection and mediastinal radical lymphadenectomy. Lobectomy/bilob. was performed in 62 cases, and pneumonectomy in 8. Histology was: squamous cell carcinoma: 43 cases, adenocarcinoma: 24 cases, others: 3 cases. Pathological staging was T1N0: 21 cases; T2N0: 49. Upon informed consent patients have been randomized into two groups (G1 and G2). G1 received radiotherapy (linac photons, angled field technique; target volumes: bronchial margin and homolateral hylum; daily fraction dose: 180 cGy for five days per week; total dose: 5040 cGy). G2 didn't receive any adjuvant treatment. 33 patients have entered G1 and 37 G2.

Results. Only one major complication has been observed post-operatively (a broncho-pleural fistula). 10 patients have been excluded from the study (appearance of a new malignancy, other than lung), 6 in G1 and 4 in G2. Descriptive statistics of results are in table I and II.

Table I

	G1+G2 (# 60)		G1 (# 25)		G2 (# 35)	
	T1N0 (Ia) # 19	T2N0 (Ib) # 41	T1N0 (Ia) # 6	T2N0 (Ib) # 19	T1N0 (Ia) # 13	T2N0 (Ib) # 22
Disease free interval	44 months	39 months	41 months	40 months	45 months	37 months
Recurrence rate (a)	6 (31.5%)	20 (48.8%)	1 (16.6%)	6 (31.6%)	5 (38.5%)	14 (63.6%)
Recurrence rate (b)	4 (21%)	4 (9.7%)	/	/	4 (30.8%)	4 (18.2%)
Recurrence rate (c)	2 (10.5%)	16 (39%)	1 (16.6%)	6 (31.6%)	1 (7.7%)	10 (45.5%)

a) overall recurrence rate; b) local recurrence rate; c) distant recurrence rate (distant metastasis)

a), b), c) number of observations (in 3 cases a local+distant relapse has been observed and reported)

Table II

	G1+G2	G1+G2	G1	G1	G2	G2	p [§]	p [§]	p [§]	p [§]
	T1N0	T2N0	T1N0	T2N0	T1N0	T2N0	Ia	Ib	G1	G2
	(Ia)Ib	(Ib)	(Ia)	(Ib)	(Ia)	(Ib)	G1 vs G2	G1 vs G2	Ia vs Ib	Ia vs Ib
Mean FUP (mo)	54.5	43.8	50.2	46.9	56.5	41.1				
Survival*%	68.4	43.4	66.7	56.1	69.2	34.1	n.s.(0.9)	n.s.(0.3)	n.s.(0.7)	n.s.(0.1)

* actuarial five years survival (life table analysis)

§ log-rank test calculated on the survival curves obtained with the Kaplan-Meier method

Conclusions. Adjuvant treatment with radiotherapy in p-stage I (a and b) NSCLC:

- has been well tolerated;

- didn't modify significantly overall survival;
- apparently allowed to obtain a better control on the local recurrence rate.

In our study staging proved to be the most significant prognostic factor.

PRIMARY RECONSTRUCTION AFTER CHEST WALL RESECTION

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INTRODUCTION - Resection and primary reconstruction of the chest wall has been proven to be an effective and safe surgical procedure. The indications for chest wall resection are T3 primary lung cancers, local recurrences after breast cancer surgery, primary and metastatic neoplasms arising in the chest wall. An effective reconstruction of the chest wall should support respiration and protect the underlying thoracic organs. We present our experience on primary reconstruction after extensive chest wall resection.

METHODS - We performed a retrospective review of 12 patients who underwent resection and primary reconstruction of chest wall. Of these patients, 7 had T3 primary lung cancer, 3 had primary chest wall malignancy, and 2 had local recurrences after breast cancer surgery. The mean follow-up was 3.4 years.

RESULTS - In the group of patients with T3 primary lung cancer an "en bloc" chest wall resection was carried out; the number of resected ribs ranged from 1 to 4; we also performed 1 diaphragm resection and 1 sternum resection. Prosthetic materials were used in 4 patients (dura mater: 2 cases; Vicryl mesh: 1 case; sandwich of acrylic and marlex for sternum reconstruction: 1 case), and muscular flaps in 3 patients (serratus anterior; latissimus dorsi; and diaphragm; in this latter case the diaphragm was implanted over the defect at the level of the upper rib). In the group of patients with primary chest wall malignancy the chest wall defect was repaired by dura mater in 2 cases and by Vicryl mesh in 1. In the 2 patients who underwent chest wall resection and reconstruction for local recurrences after breast cancer surgery we used muscular flap (rectus abdominis; latissimus dorsi). All except one achieved primary wound healing. One patient who underwent chest wall resection after breast cancer surgery presented a wide wound infection and necrosis which required a multiple skin grafting. No rejection was reported nor episodes of flail chest or respiratory disorders. Cosmetic results were considered satisfactory in all patients. We observed a good control of chest pain in all patients. There were 4 deaths, all due to metastatic lung cancer.

DISCUSSION AND CONCLUSIONS - The results of our study suggest that reconstructive surgical procedures after extensive resection of chest wall are useful and safe for patients with locally advanced chest neoplasms. We repaired the chest defect for cosmetic reasons as well as to reduce the paradox; the chest wall defect was filled for anatomic-functional reasons, particularly in patients with marginal pulmonary reserve, when the resection interested the so called "critical areas" (sternal, anterior and lateral area). There was only one postoperative complication (extensive wound infection and necrosis). The functional results were satisfactory in all cases with no episode of respiratory failure.

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VIDEO-THORACOSCOPIC TREATMENT OF MALIGNANT PLEURAL EFFUSION UNDER CONSCIOUS SEDATION

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INTRODUCTION: Most surgeons perform video assisted thoracic surgery (VATS) to diagnose and treat pleural effusion under general anaesthesia and double lumen tube.

Scope: The AIM of this study is to know whether or not VATS can be performed safely under local anaesthesia and conscious sedation to diagnosis and treat malignant pleural effusion. **METHODS:** In the last 12 months we performed 11 VATS for malignant pleural effusion under conscious sedation. History of breast cancer was present in 4. Associated conditions were lung cancer in 2, pleural thickening in 2 and mediastinal mass in 1. Diagnostic work-up included chest-x ray, CT scan and thoracentesis. We used a malleable 20 mm trocar which permits, when it is positioned in the intercostal space, a working channel of 28 mm. This diameter allows the introduction of the 5 mm. optic, and 1 or 2 surgical instruments such as scissor, forceps, lung retractor etc. **RESULTS:** There were 5 male and 6 female with a mean age of 53 y.o. (range 50-78). The patient was generally positioned in lateral decubitus and the trocar introduced in the VI intercostal space. Pleural cavity was always evacuated from the fluid, adhesions and loculations were removed, multiple biopsies were taken from the suspected lesions of pleura, lung or mediastinum. Pleurodesis was performed in all patients with the insufflation of 3-5 mg of talc. Histologic diagnosis was metastasis of breast cancer in 4, mesothelioma in 3, lung carcinoma (trapped lung) in 2, invasive tumour in 1, pleural fibrosis in 1. **CONCLUSIONS:** on the basis of our experience we believe that VATS, under local anaesthesia and conscious sedation, can be safely performed to diagnosis and treat malignant pleural effusion. **REFERENCES:** Cerfolio R J, Shiels T M, Holman W L et al.: Thoracoscopic surgery without double lumen endotracheal intubation. Chest 1997; Vol 112 Supplement pag. 19-20.

Combined modality treatment for stage IIIa non-small cell lung cancer. Long term results and pattern of relapse.

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Introduction: lung cancer is the leading cause of cancer mortality. Surgery is the treatment of choice in stage I and II non-small cell lung cancer (NSCLC). However, between 30 and 40 % of the patients will have locally advanced disease (Stage III) at the time of diagnosis. Results of surgical treatment of stage III NSCLC are limited, especially in case of mediastinal lymph-node involvement.

Methods: a phase II prospective trial was performed at our Department to evaluate a multimodality approach with neoadjuvant MPV (mitomycin c, vinblastine and cisplatin) chemotherapy, surgery and postoperative radiotherapy in stage IIIa NSCLC in terms of long-term survival and recurrence pattern.

Results: from November 1990 to June 1997, 57 patients with stage IIIa NSCLC entered the trial. A major response to the treatment was observed in 46 patients (81%); 37 of them underwent surgery. The overall radical resection rate of 60%. No postoperative mortality was observed. The overall median survival is 19 months, 37 months in patients that underwent complete resection. The survival rate is 39% and 34% at 3 and 5 years respectively. The recurrence of neoplastic disease was local in 2 patients and metastatic in 8 cases.

Conclusions: a relatively high incidence of systemic recurrence in patients with neoplastic disease progression was observed, suggesting the opportunity to evaluate the role of postoperative chemotherapy.

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TECHNICAL ADVANCES AND RESULTS IN SURGICAL CORRECTION OF PECTUS EXCAVATUM

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INTRODUCTION. To investigate the role of surgical correction of pectus excavatum and evaluate results, we reviewed our experience between 1978 and 1998.

METHODS. We operated on 57 patients with the original technique called "sternochondrocostoplasty with internal stabilization". There were 45 males (79%) and 12 females, with a mean age of 19.2 years. The modified surgical technique consisted of subperichondrial resection of two cylinders of cartilage for each costal cartilage, transverse osteotomy of the sternum and stabilization with two metal supports (1). Echocardiographic study, pulmonary function tests and Welch Index measurements were assessed before surgery and during follow-up.

RESULTS. Patterns of respiratory failure showed before operation improved postoperatively in 62% of patients. Marked morphologic and haemodynamic improvement was found on echocardiography, with an increase of diastolic volume and stroke volume mainly for right ventricle. A significant reduction in Welch Index was observed after surgery.

COMMENT. Cardiorespiratory function impairment is present in severe pectus excavatum deformity. In our experience, the progress in surgical correction leads to improvement of both heart and lungs function. Besides the renewed interest for silastic implant techniques (2), we recommend surgical repair when severe deformity is present.

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Transplantation

DE NOVO TUMORS AFTER ORGAN TRANSPLANTATIONS: EXPERIENCE OF A SINGLE CENTER

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Introduction It is reported the experience of S. Orsola Hospital of Bologna on the de novo malignancies after transplant of kidney (KT), liver (OLT) and heart (HT). **Methods:** A retrospective analysis was performed. **Results** The incidence of the de novo tumors has been of 3.6% (32/869) after KT, of 3.6 % (13/353) after OLT, and of 3,2% (4/124) after HT. **KT:** The mean age of pts (patients) (21M and 9F) undergone to KT was of 48,8 (range 28-61). Three pts received a kidney from a living donor. Pathology: 5 skin basal cell ca (cancer), 5 Kaposi sarcoma, 3 uterus cervix ca., 2 bladder papillary ca, 2 skin squamous cell ca., 1 mediastinum metastasis from seminoma, 1 native kidney adenoca., 1 breast adenoca., 1 skin melanoma, 1 HCC, 1 mouth squamous cell ca. 1 bowel adenoca., 1 gastric non Hodgkin lymphoma, 1 B lymphoma of the pre-aortic lymph nodes, 1 leukemia, 1 gastric adenoca., 1 myeloma, 1 pancreas ca, 1 prostate ca, 1 visceral metastasis from unknown primitive tumor. The mean interval of appearance of the tumors has been of 69 months (4-210 months). Immunosuppressive therapy (IT): Az.+ St. in 13 pts., CyA+St. in 8 pts, triple in 9 pts. 17 pts had rejection episodes treated with St and/or GAL. **OLT:** The mean age of pts (the 9M and 4F) was of 45.7 years (range 23-55). IT: C+St in 8 cases, and triple in 5 cases. 8 pts had episodes of rejection treated with bolus of cortisone and/or OKT3. Istology: 3 skin ca., 2 bladder ca., 2 breast ca., 2 rectum-colon ca., 1 larinx ca., 1 non Hodgkin lymphoma biliary tract, 1 tongue ca., 1 pancreas adenoca. with hepatic metastasis. The medium interval of insorgence of the tumors has been of 44.3 months (range 6-90). **HT:** All the pts were males with a mean age of 55 yrs (44-62). Triple IT in all the cases. In all the pts episodes of rejection have been taken place. Istology: 1 pancreas adenoca with visceral multiple metastasis, 1 kidney with visceral metastasis, 2 metastasis from skin melanoma. **KT:** Five pts were inoperable for the extension of the neoplasm. In the remaining 25 pts we perform: radical surgery in 18 cases, radiotherapy in 4 pts, chemotherapy in 3 pts. In 20 cases IT has been reduced. 28 pts has maintained a normal graft function while 2 pts are returned in dialysis. The deaths have been 10 (8 for the neoplasm). The remaining 20 pts are living with a medium follow-up of 138,8 months. **OLT:** The surgical therapy has been radical in 10 pts, palliative in 2 pts; 1 pts with pancreas adenoca + hepatic metastasis wasn't operable. Three pts are dead at a distance of 96, 23 months and 20 months from OLT (2 for neoplasm). Ten pts are living with a medium follow-up of 56.3 months. **HT:** The tumors appeared within 24 months from the HT have been the most aggressive with distance metastasis in 100% of the cases; all the pts are dead within 30 months. **Conclusions** The incidence of malignancies was similar in all considered groups. The shortest mean interval of appearance of the tumors was observed after HT while the longest one was after KT. An oncological surgical therapy was performed in 77% of OLT pts and in 60% of HT pts.

CONVERSION TO MYCOPHENOLATE MOFETIL TO AMELIORATE RENAL FUNCTION IN LIVER TRANSPLANTATION WITH CYCLOSPORINE TOXICITY: preliminary results

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The use of cyclosporine (CsA) is associated with well documented side effects. Long term maintenance therapy with CsA shows a remarkable

incidence of renal toxicity. Current therapeutic options are conversion from CsA to Azathioprine or adoption of a dual drug regimen which consists of Azathioprine + low doses of CsA. Mycophenolate Mofetil (MMF) is a new immunosuppressive drug which blocks the de novo synthesis of guanine nucleotides. In contrast to CsA and FK-506, MMF is not nephrotoxic. Recent pilot studies have demonstrated the effectiveness of rescue therapy with MMF in patients with CsA-toxicity in kidney transplantation. Use of MMF in liver transplantation (LTx) has not been extensively investigated, particularly in long term patients. LTx patients with previous post-hepatitis cirrhosis are good candidate to the MMF therapy because of: 1. Pre-tx, low to mild renal impairment; 2. Reduced rate of late rejection; 3. General contraindication to long term use of steroids. 5 liver transplant pts with history of post-hepatitis cirrhosis, absence of rejection and evidence of CsA nephrotoxicity were converted at (87, 49, 42, 36, 32 month post-tx respectively) from CsA to MMF (2 g/die) + minimal CsA doses (CsA target trough levels = 50-75 ng/ml). Mean follow up was 8+2 months. No patient experienced acute rejection. The mean serum creatinine concentration decreased from 2.6 mg/dl to 1.7 mg/dl, although the difference did not reach statistical significance. Hyperlipidemia and blood pressure also improved in all patients. **CONCLUSIONS:** Mycophenolate Mofetil is a promising therapeutic option for LTx patients with CsA toxicity. Conversion from CsA to MMF+minimal CsA levels seems to be feasible and allows an important improvement of renal function.

LIVER TRASPLANTATION IN HEPATOCELLULAR CARCINOMA

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Hepatocellular carcinoma (HCC) still represents one of the most common malignant tumors worldwide with an 9 occurrence between 30 cases over 100.000 persons each year in high risk country to 2 over 100.000 in Italy. Surgical treatment by liver resection still remains the mainstay for treating with a five years survival between 25 and 30%.

Hepatic resection is unable in multicentric liver disease or in cases of HCC in cirrhotic patients; in these cases liver transplantation may be the best solution.

Trans arterial chemoembolization, percutaneous ethanol injection, thermoablation could be considered in cases of little tumor in cirrhotic patients showing best results compared with liver resection.

From February 1991 to December 1998, 124 patients with HCC were observed in our Institute for liver transplantation.

A rational and selective approach to this particular group of patients originates from the evaluation of fundamental aspects: ultrasound evaluation, CT scan, Histologic confirmation of malignancy, diagnostic laparoscopy to determinate the extension of the tumor, virus and specific tumor markers detection.

After this evaluation in 60 (49%) patients was confirmed the indication to liver transplantation.

Pre-operative chemotherapy was performed in all patients, trans arterial chemoembolization in 3 patients and percutaneous ethanol injection in 2 cases.

Post transplant immunosuppression was performed in all cases.

Histological variability the infiltration of blood vessels and local extension are the most important factors related on long term results.

The most common metastasis places are lungs and bone; the recurrence of tumor in transplanted liver are sometimes related to surgical procedures during the epatectomy.

Pre and post transplant chemotherapy are fundamental in the increasing of results, immunobiology and new drugs could better improve the long term prognosis with a less recurrence of pathology.

T-TUBE RELATED BILIARY COMPLICATIONS AND STEROIDS AFTER LIVER TRANSPLANTATION

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Purpose. Use of T-tube is still a controversial issue in liver transplantation (LTx). T-tube related biliary complications (T-BCS) are reported in about 10% of cases and include: accidental removal, migration, leak at planned removal (LPR), stenosis, rupture. LPR is the most frequent T-BCS ranging from 5% to 7%. Material of T-tube (rubber or latex) and steroids administration seem to play a role in the onset of LPR. In order to evaluate the impact of steroids on LPR we reviewed our 135 LTx in 128 patients (pts). **Materials and methods.** We have always performed an end-to-end choledocho-choledochal anastomosis over T-tube, with 5/0 PDS running suture, with planned removal at three months. We have routinely used a T-tube intraoperative cholangiography. 97 pts with follow up > 3 months were eligible for this study. They were divided in three groups on the basis of the immunosuppressive protocol applied. Steroids administration consisted in low doses with early withdrawal at three months. **Results.** The overall incidence of biliary complications that required operative treatment (surgery, interventional radiology, endoscopy) in this series was 5.2% (stenosis 2, leaks 3, choledocholithiasis 3). The incidence (%) of LPR in the three groups was: Cya-Aza-Steroids (15.6%); FK 506-Aza-Steroids (40%); Cya-Aza (7.4%). Three pts had an accidental early dislodgement of T-tube. All pts were treated with fluids administration and antibiotics. LPR incidence in 69 pts that received steroids was 17.3% versus 7.4% of steroids free pts ($p < 0.05$). **Conclusions.** These data confirm that our policy of steroids free LTx can dramatically reduce the incidence of T-BCS.

ETHICAL DILEMMA IN THE DONOR-RECIPIENT MATCH

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The limited number of organs available and the large number of pts on Waiting List (WL) for transplantation (tx) induce organs sharing organisation to update the guidelines in the donor-recipient selection, particularly so, for life-saving procedures (liver tx, heart tx, lung tx). Up to now, criteria for choosing a recipient are: time on WL, national or regional identity criteria and severity of disease. Presence of emergency WL induces utilisation of "marginal donors" to enlarge the donor pool: this policy, indeed, was able to achieve remarkable results but posed new questions: Should marginal donors then be used for normal risk pts?; If this is so, should high risk pts and pts on emergency-WL be transplanted with optimal organs?; It is well known that high donor age, pre-existing disease and deteriorated donor conditions do not contraindicate tx, even if these factors represent negative prognostic indices; in turn also, high recipient age, severity of disease and multi-organ involvement of disease represent negative prognostic indices. In terms of survival, the difference between cases with different prognostic indices fares from 5 to 20%. This gap is quite similar to the difference observed between recipients with different preoperative disease. From a mathematical point of view there is no reason to cumulate two or more negative prognostic indices. In other words, to improve prognosis a good donor should be used for an high risk pt and a sub-optimal donor for a low risk pt in the effort to treat the larger number possible of pts on the WL and not only to achieve the best results in a smaller subset of transplanted pts (low risk pts). Corollaries of this theorem are: 1. Should routine preoperative consent be requested the recipient regarding the use (or non use) of a less than optimal donor?; 2. Who should choose the recipient: a computer, a transplant surgeon, a multidisciplinary team (internist, surgeon, ethical expert)?.

MINIMAL INVASIVE TREATMENT OF PORTAL STENOSIS AFTER OLTx

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Portal stenosis represents one of the major complications after orthotopic liver transplantation.

Patients, on whom prior a relaparotomy had to be effectuated, may be eligible for a minimal invasive approach.

A Mc Burney minilaparotomy in the fossa iliaca dx is performed : after exposing the terminal loop of the ileum a distal vein is isolated and catheterized with a Seldinger vascular catheter.

After portography, an angioplastic balloon catheter is passed through the superior mesenteric vein into the portal vein. After measuring the pre and poststenotic blood pressure, the stenotic segment is dilated under fluoroscopic control. Prior to closing the wound another portography and blood pressure are undertaken.

The minimal invasive approach avoids the dissection of the hepatic peduncle and represents thus the treatment of choice for portal vein stenosis after OLTx. BIBLIOGRAPHY

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MARGINAL DONORS IN LIVER TRANSPLANTATION: THE ROLE OF DONOR AGE

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Discrepancy exists worldwide between the number of suitable liver donors and the increasing demand for transplantation. Thus many Center have considered widening their liver donor acceptance criteria and this fact may increase the incidence of primary dysfunction (PD) with negative effects on the results of transplantation. In order to identify those risk factors associated with its we evaluated occurrence, in a retrospective univariate and multivariate analysis, several donor, preservation and recipient parameters and their correlation with PD and long term survival. In our Department 400 OLTx were performed on 368 adult patients over a 12 years period. 19 were excluded as a consequence of early vascular problems (15 cases) and intraoperative deaths (4 cases). A complete series of donor, recipient and procedure-related data were analyzed. About 30% of donors presented altered parameters. 70 PD occurred (26%) with a 61.4% graft failure rate vs 15% in the group of immediate function. ($p < 0.05$). At univariate analysis donor age, steatosis, ischemia time, amines, oliguria, hypotension and ICU stay were significantly associated with PD. At multivariate analysis steatosis, ischemia time and amines dosage were independent risk factors for the development of primary-non-function. In conclusion the acceptance of marginal donor worsened the results of transplantation, however the discharge of these donors should reduce of about 30% of our transplant activity with increased mortality in the waiting list. Combinations of risk factors when possible are to be avoided; ischemia time, as the only variable that can be controlled should be kept as short as possible.

THE LAPAROSCOPIC TREATMENT OF LYMPHOCELE AFTER KIDNEY TRANSPLANTATION

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Introduction. The management of lymphocele (LY) following kidney transplant is evolving. Percutaneous needle aspiration, external catheter drainage, simple or with instillation of sclerosing agents, and open surgery are the traditional treatments. Recently several authors advocated laparoscopic drainage (LD) as the procedure of choice. We report our experience with this new technique. **Methods.** From April 1986 to December 1998, 523 kidney transplants were performed in our Institute according to the standard retroperitoneal technique. 15 (2,8%) patients developed symptomatic LY; 10 (1,9%) patients were treated conservatively; 5 (0,9%) patients were submitted to LD. Preoperative introduction of a small drain into the LY was always performed except in the first case. Three ports (one: 10 mm - two: 5 mm) were used and a generous portion of LY excised with careful internal inspection to exclude secondary loculations. Finally a marsupialization of the wall was completed. **Results.** 3 (33%) patients was not cured by conservative treatment and open surgery had to be performed. In the first patient the laparoscopic procedure was converted for injury to the bladder. In the other patients the procedure was well tolerated with a short postoperative stay (mean 3 days) without complications and recurrences at a mean follow-up of 50,7 months (range 6-80). **Discussion and conclusions.** A considerable percentage of LY is treated successfully conservatively. Open and laparoscopic surgery offer substantially same outcomes. Obviously the LD has all advantages of the minimally invasive approach (short postoperative time, quick recovery). However a real problem is to identify the LY and to avoid damage to surrounding structures as in our first case; moreover LY expanding laterally is more difficult to treat. In all 4 last cases the preoperative introduction of a catheter into the LY to fill it during surgery has been particularly helpful for exact identification. At our opinion external preoperative US does not offer the same advantages. Probably laparoscopic US will be the technique of choice. The feasibility, safety and efficacy of LD seems to be confirmed in our experience, so we suggest it after a short trial of conservative treatment.

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STEROID WITHDRAWAL IN KIDNEY TRANSPLANTED RECIPIENTS WITH PREVIOUS ACUTE REJECTION EPISODES.

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Purpose. If the administration of steroids is related to multiple side effects, acute rejection (AR) is the risk of steroids withdrawal. MMF is a new powerful immunosuppressive drug that in combination with CsA, reduce the incidence of AR facilitating the discontinuation of steroids, without increasing the risk of AR.

Patients and Methods. Eight patients (pts) with kidney transplant (KTx), M/F: 3/5, mean age at Tx: 41 ys (St.Dev. 7.8 ys), are object of our study. Initial immunosuppression of pts was based on steroids, azathioprine (Aza) and CsA. Aza was replaced with MMF in all 8 pts for AR episodes. In 6 pts AR

was biopsy proven, in 1 pt there was the cross-match positive, in 1 pt with clinic diagnosis. After the introduction of MMF (mean time after KTx: 5.6 months – SD: 11.7 months), in all 8 pts was gradually interrupted the administration of steroids (mean time from the introduction of MMF: 7.6 months – SD: 4.4 months), and every pt was steroid free from a minimum of 6 months.

Results. Mean serum creatinine at the time of steroid withdrawal was 2.4 mg/dl (SD: 0.9); mean serum creatinine at the last ambulatory visit (minimum time 6 months after steroid withdrawal) was 1.9 mg/dl (SD: 0.7). No acute rejection episodes occurred after steroid withdrawal, in this pts with previous AR episodes. We do not report increasing in bacterial infection and no one pt had any viral infection; just one pt needed the reduction of MMF dosage for diarrhea.

Conclusions. Although long term study are needed, this study shows that steroid withdrawal is a safe procedure in kidney transplanted recipients receiving CsA and MMF, and also in that pts with previous acute rejection episodes.

Biliary complications in adult and pediatric patients after liver transplantation, today

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Introduction Biliary complications are known to be an Achilles's hill in liver transplantation (LT) both in adult and pediatric patients (pts). We wanted to point out this problem, in whole and reduced size liver grafts, notably after the introduction of split liver techniques.

Methods From April 1994 through November 1998, 189 consecutive LT were performed in our unit: 115 LT were performed in adults (mean age 44±10 years), 74 in pediatrics (mean age 5±5 years). In adults, 109 were whole size grafts (WG), 6 reduced size grafts (RG), all retrieved with split liver techniques (in situ in 5 cases, ex situ in one). In pediatrics, 49 were WG, 25 RG (11 left split livers – 4 in situ, 7 ex situ-, 10 partial and 4 reduced grafts). In WG a cholecysto-choledochal (CC) anastomosis was performed in 72% of adults and in 22% of pediatrics; in RG an hepaticojejunal (EJ) anastomosis was performed in 33% of adults and in 100% of pediatrics. Mean follow-up from LT was 21±18 months in adults, 25±17 in pediatrics. The rate of biliary complications and actuarial survival were evaluated.

Results 25 adults (21%) and 11 pediatrics (14%) had biliary complications. WG had complications respectively in adults and pediatrics, in 20% and 6% of grafts whereas RG in 50% and 32%. Moreover, split grafts in pediatric pts had biliary complications in 27% of cases, non-split grafts, in 35%.

CC had an higher rate of complications than EJ (22 vs 17%) in adults with WG; lower rates but with an equivalent distribution (9% vs 5%) was found in pediatrics with WG. 1 and 5 years actuarial survival rates were 76% and 73% in adults, 83% in pediatrics.

Conclusion. Though the dramatic improvement in patient and graft survival biliary complications are still a problem in liver transplantation.

In our review, concerning LT performed in the last 4 years in our unit, the rate of these complications is still high: higher rates are encountered in adults than in children, in CC anastomosis than in EJ, in RG than in WG.

Though the limited number of grafts, right grafts from split livers in adults had the highest rate of biliary complications (50%), whereas left grafts from split livers in children had lower rates. So in split livers, right grafts in adults deserve more attention for biliary complications.

INCREASED INCIDENCE OF INFECTION IN VERAPAMIL (VER) TREATED KIDNEY TRANSPLANT RECIPIENTS

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Calcium antagonists, in association with cyclosporine (CsA) immunosuppression, have been used to positively influence the clinical course of transplants. CaANT, through an improvement of renal perfusion, a reduced lymphocyte response and increased CsA blood levels, should improve immunosuppression, decreasing the incidence of rejection. We have studied the effect of Verapamil, both on graft survival and infective complications. 152 renal tx pts were assigned to 240mg/day of VER regimen for 10 days or to the control group. 2-3 mg/kg/day of iv CsA were used in the first 3 days followed by an oral dosage of 12mg/kg/die with a blood target level of 350-550 ng/ml or a average level based on AUC of 600ng/ml.

	n. pts	ATN	ATG	ReTx	AZA	REJ	NoATG	ATG	CMVneg
total	152	40(26%)	43(28%)	4	13	41(27%)	21%	42%	12(8%)
VER	77	9(12%)	13(17%)	1	5	19(25%)	20%	46%	3
no VER	75	31(41%)	30(40%)	3	8	22(29%)	22%	40%	9

It should be noted that the no VER group has a higher number of ATN as in this condition CsA is usually discontinued. There are no significant graft survival difference at one year (89% in VER vs 93%). A significant difference is evident in infection rate. All these infections required hospitalization and in most case ICU treatment for pneumonia (CMV 14 cases, fungi 4, Pseudomonas 2, unknown 1):

	all	ATG	AZA	ReTx	REJ	CMV-	Death
total	21(14%)	11.6%	6/21	2/21	8/21	4	4(19%)
verapamil	17(22)	3/17	3/17	0	5/17	3	3
no verapamil	**4(5.3%)	2/4	3/4	2/4	3/4	1	1

** = chi²; P<0.01. We have also analyzed the blood CsA levels(ng/ml)(M/SD):

postop days	3 rd	5 th	7 th	10 th	15 th	20 th	dischar
VER	562/450	530/258	546/244	600/308	568/311	509/200	546/259
no VER	552/543	335/220	365/210	448/237	500/258	476/191	504/240

ANOVA: P<0.01. Our data show an increased incidence of severe infections in VER treated pts: the majority of episodes occurred in the first 4 months (18/21), in relation to the induction of immunosuppression. The infection risk is low in ATG or AZA treated pts; the CMV negative condition is not relevant. If we exclude the retransplant pts the difference between the two groups is even more evident. This increased infection risk in VER treated pts can be in relation to the increased CsA level or to a direct immunosuppressive action of the drug, since 6 out of 17 of infection of VER group had CsA blood levels under the mean values of the entire group. The effect on CsA levels could be even more striking considering the immunosuppressive effect of some CsA metabolites. Finally, even if long term effects on chronic rejection and infection still need to be analyzed, we suggest a particular caution in usage of this drug given the availability of Neoral for the same purpose.

The role of the thymus in transplantation tolerance: a study with direct implantation of radiolabelled white cells.

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Introduction. The induction of donor-specific tolerance is a goal of transplantation research. Several Authors describes in the rat a novel approach to tolerance induction by direct inoculation of donor antigens into the thymus of the recipient. Our previous experience in swine small bowel transplantation failed in attempting tolerance by intrathymic injection of donor white cells.

This could be explained by the Ag escape from the recipient thymus. The present study was designed to evaluate the localisation of inoculated Ag in the thymus of pigs.

Materials and methods. White cells (300-350 M) isolated from venous blood were radiolabeled in vitro by incubation for 25 minutes with Tc-99m NOEt. 42% (range 1.3-8 mCi) of the radioactivity was incorporated into resuspended cells (mean 217 M) and direct injected into each thymus, surgically isolated. Cell homing post injection was assessed by scintigraphic imaging. Pigs were sacrificed 8-48 hrs after cell administration. Thymus was harvested in six animals to detect residual radioactivity measured in a well-counter.

Results and discussion. Scintigraphic imaging, showed a negligible thymic washout (>0.5% / h) up to six hours. Thymus mean radioactive content (as % Dose/g of tissue) was 8.5, 6.5 and 10.6 at 8, 20 and 44-48 hrs respectively; the higher variability was observed at 44-48 hrs. Thymic retention of swine white cells, as assessed by thymic scintiscans and radioactive retention measurements up to 20 hrs, support a very low wash-out (>0.5% / h) of implanted cells. A wider variability of thymic retention was observed later, possibly due to heterogeneity of leucocyte populations labelled, explaining our previous data.

COMPARISON OF CELSIOR (CS) AND UNIVERSITY OF WISCONSIN (UW) SOLUTION FOR KIDNEY PRESERVATION IN A PORCINE AUTOTRANSPLANTION MODEL

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Introduction UW is one of the most used solutions for kidney preservation up to 24h. Preservation for longer than 24h continues to demonstrate an high incidence of acute tubular necrosis. CS solution was recently proposed for preserving abdominal organs. The aim of our comparative study was to evaluate the efficacy of UW and CS solution in the kidney cold preservation.

Methods We used an autotransplantation (ATx) pig model to avoid immunological interferences. The animals were divided in four groups (5 animals for each group) in which kidneys were perfused with CS or UW and preserved up to 24 or 32 hours. The left kidney was harvested and immediately bench perfused through the renal artery with 200 ml of cold solution. Finally, the organ was preserved in the same solution for 24 or 32h. After the preservation time the kidney was transplanted on the left side with arterial anastomosis to aorta and venous anastomosis to inferior vena cava. The urinary continuity was reestablished by ureter-ureteral anastomosis. A kidney biopsy for histological analysis was taken before and 1h after reperfusion. In all animals right nephrectomy was performed before abdominal closure. Renal function after ATx was evaluated by determination of s-creatinine and BUN at 1, 3 and 7 p.o. day. All animals were sacrificed after 1 week and histological study of the kidney was performed. **Results** All the animals survived at 7 days. Kidney function was totally recovered in both CS and UW 24h group (1st p.o. day mean s-Cr: CS = 4.33±0.54 vs UW = 4.70±0.63 mg/dL) (4th p.o. day mean s-Cr: CS = 2.5±0.43 vs UW = 2.7±0.58 mg/dL) (7th p.o. day mean s-Cr: CS = 1.6±0.38 vs UW = 1.8±0.53 mg/dL). Kidney function was recovered in 4/5 animals in both CS and UW 32h group (1st p.o. day mean s-Cr: CS = 5.21±0.61 vs UW = 5.35±0.75 mg/dL) (4th p.o. day mean s-Cr: CS = 3.5±0.52 vs UW = 3.7±0.66 mg/dL) (7th p.o. day mean s-Cr: CS = 2.4±0.32 vs UW = 2.6±0.35 mg/dL). The BUN levels in the CS group were slightly lower as compared to UW group at 24 and 32h. The histological analysis before reperfusion showed a normal pattern in CS as well as UW preserved 24 and 32h kidney. After 1h reperfusion balloon swelling and cellular edema was observed in both groups without significative differences. The 7th day histology appears worse in 32h preserved kidneys compared to 24h groups: however no differences were found between CS and UW preserved kidneys. **Conclusions** Based on our results we may conclude that CS has the same efficacy to that of UW in the cold storage at 24 and 32 h of pig ATx kidney.